# Town of Bourne - Water Resources Nitrogen Loading and Mitigation Worksheet

*See Cape Cod Commission Technical Bulletin 91-001 for further details: https://capecodcommission.org/resource-library/file/?url=/dept/commission/team/Website_Resources/regulatory/NitrogenLoadTechbulletin.pdf*

Facility Address: 90 Circuit Avenue
Preparer's Name: Cape & Island Eng.
Date: 5/10/2023
Watershed: Buzzards Bay

**Project Nitrogen Load** — ***Proposed Wastewater*** — ***New Construction/ Raze & Rebuild, Increases in Flow, or Repairs/ Upgrades***

1. Project Title-5 wastewater flows: 220.0 gpd **(a)**
Actual wastewater flows: 175.0 * **(b)**
Calculated value — Average wastewater flows: gpd **(a)+(b) ÷2=** **(A)**
* Title-5 flows prescribed by TB91-001 for commercial uses

Place √ in applicable box:

| Yes | No | |
|---|---|---|
| | X | Will the project be connected to sewer ? |
| √ | | Is project Title-5 wastewater flow 10,000 gpd or greater ? |

Place √ in applicable box and multiply unsewered wastewater flow by applicable conversion factor:

| | | | |
|---|---|---|---|
| | Standard Title-5 System (35-ppm-N) | x | 0.048359 |
| | DEP-approved I/A System (25-ppm-N) | x | 0.034542 |
| x | DEP-approved I/A System (19-ppm-N) | x | 0.026252 |
| | DEP-approved Enhanced I/A (12-ppm-N) | x | 0.016580 |

} Type of system: _____

Wastewater nitrogen load **(Title-5 flows)** = 5.78 kg-N/yr **(B)**

Wastewater nitrogen load **(Actual flows)** = 4.59 kg-N/yr **(C)**

***Stormwater Runoff***

Town of Bourne — Recharge rate for Bourne (inches; for natural areas from Technical Bulletin 91-001): : 21 **(RECH)**

Project site area: 0.123 acres **(D)**

Project site wetland area: 0.000 acres **(E)**

Project site upland area: 0.123 acres **(F)**

Pervious unpaved upland: 0.079 acres **(G)**

100 % using LID — Paved area: 351 s.f. **(H)**
*Factor may be adjusted for employment of LID →* x 1.0619E-04
*LID = low impact development* = 0.03727199 kg-N/yr **(I)**

Roof area: 1,561 s.f. **(J)**
x 7.0792E-05
= 0.1105 kg-N/yr **(K)**

***Fertilizer*** — Previous unpaved upland - roof area =
Managed turf/ lawn area 2,500 s.f.
x 3.4019E-04
= 0.850 kg-N/yr **(L)**

***Total Nitrogen Load***

Total project nitrogen load **(Title-5 flows)**: 6.77 kg-N/yr **(M)= (B)+(I)+(K)+(L)**

Total project nitrogen load **(Actual flows)**: 5.59 kg-N/yr **(N)= (C)+(I)+(K)+(L)**

Nitrogen load per acre **(Average)**: **50.18** kg-N/yr/acre **(O)= (M)+(N) ÷2 ÷(F)**

***Proposed Nitrogen Loading Concentration***

Project nitrogen loading concentration (**Title-5 flows**): **10.33** ppm-N **(P)=** $\frac{(M)}{(a)\div 723.76 + (G)\times(RECH)\div 9.7286 + (H)\div 10{,}594 + (K)\div 0.75}$

Project nitrogen loading concentration (**Actual flows**): **9.42** ppm-N **(Q)=** $\frac{(N)}{(b)\div 723.76 + (G)\times(RECH)\div 9.7286 + (H)\div 10{,}594 + (K)\div 0.75}$

Project nitrogen loading concentration (**Average**): **9.88** ppm-N **(R)= (P)+(Q) ÷2**

next page -->

***Existing Conditions***

*Calculate (A') through (P') as w/ (A) through (P):*

Title-5 wastewater flows: 220.0 gpd
Actual wastewater flows: 175.0 *
Avg. wastewater flows: 197.5 gpd **(A')**

Place √ in applicable box:

| Yes | No | |
|---|---|---|
| | X | Is existing development on sewer ? (If 'Yes', then go to line 2.) |

| | |
|---|---|
| x | Standard Title-5 System |
| | DEP-approved I/A System (commercial) |
| | DEP-approved I/A System (residential) |
| | DEP-approved enhanced I/A |

10.64 kg-N/yr **(B')**

8.46 kg-N/yr **(C')** wastewater offsets

Project site area: 0.123 acres **(D)**

Project site wetland area: 0.000 acres **(E)**

Project site upland area: 0.123 acres **(F)**

Pervious unpaved upland: 0.079 acres **(G')**

Paved area: 351 s.f. **(H')**

Paving runoff offset: 0.0497 kg-N/yr **(I')**

Roof area: 1,561 s.f. **(J')**

Roof runoff offset: 0.1105 kg-N/yr **(K')**

Managed Turf/ lawn area: 2,500 s.f.

Fertilizer offset: 0.850 kg-N/yr **(L')**

Existing nitrogen load (Title-5 flows): 11.65 kg-N/yr **(M')**

Existing nitrogen load (Actual flows): 9.47 kg-N/yr **(N')**

Nitrogen offset per acre: **85.72** kg-N/yr/acre **(O')**

**Existing nitrogen loading concentrations:**

Title-5 flows: **17.77** ppm-N **(P')**

Actual flows: **15.96** ppm-N **(Q')**

Average: **16.87** ppm-N **(R')**

**Resource/ Impact Based Criteria**

***Marine Water Recharge Areas / Coastal Embayments***

| | Yes | No | |
|---|---|---|---|
| 2. | X | | Is the project located in any of the following watersheds: **Buttermilk Bay Basins, Phinneys Harbor / Back River / Eel Pond, Pocasset River Basin, Pocasset Harbor / Hen Cove / Red Brook Harbor, Megansett / Squeteague Harbors** ?** *(If 'No', then go to line 3.)* |

**Name of Watershed**
(*from Regional Policy Plan Data Viewer*): Buzzards Bay

Critical Nitrogen-loading limit** : **0.000** kg-N/year/acre **(S)**

| | | |
|---|---|---|
| | X | Does project's nitrogen load **(O)** exceed the existing load **(O')** AND the critical nitrogen load **(S)** ? *(If 'No', then go to line 3.)* |

Excess project nitrogen load to be mitigated: 0.00 kg-N/yr **(T)=** LESSER OF **(O)-(S) x(F)** AND **(O)-(O') x(F)**

*** When a nitrogen-loading limit has been determined through either a Total Maximum Daily Load (TMDL), a Massachusetts Estuaries Project-accepted technical report, or specified by a Commission-approved comprehensive wastewater management plan pursuant to Objective WR3, or if impaired water quality has been documented for the receiving coastal waters, the nitrogen loading limit shall be 0 kg-N/yr per acre pursuant to Objective WR3.*

***Groundwater Quality***

| | Yes | No | |
|---|---|---|---|
| 3. | | X | Does the project's nitrogen loading concentration in groundwater **(R)** exceed the greater of **5 ppm** *or* the existing concentration **(R')** ? ***(If 'Yes' , the project will need to provide an alternative strategy for meeting these thresholds by using another worksheet)*** |

***Potential Public Water Supply Areas***

| | Yes | No | |
|---|---|---|---|
| 4. | | X | Is project in a Potential Public Water Supply Area (PPWSA) ? *(If 'No', then go to line 5.)* |
| | | | Does the project's nitrogen loading concentration **(R)** exceed the greater of **1 ppm** *or* the existing concentration **(R')** ? ***(If 'Yes', the project must provide an alternative strategy for meeting Objective WR1)*** |
| | | | Does the project use, treat, generate, store or dispose of hazardous materials in excess of the greater of a) household quantities or b) existing quantities ? ***(If 'Yes', the project must provide an alternative strategy for meeting Objective WR1)*** |

***Wellhead Protection Areas***

| | Yes | No | |
|---|---|---|---|
| 5. | | X | Is project in a Wellhead Protection Area (WHPA) ? |
| | | X | Does the project's nitrogen loading concentration **(R)** exceed the greater of **5 ppm** *or* the existing concentration **(R')** ? ***(If 'Yes' , the project must provide an alternative strategy for meeting Objective WR1)*** |
| | | X | Does the project use, treat, generate, store or dispose of hazardous materials in excess of the greater of a) household quantities or b) existing quantities ? ***(If 'Yes', the project must provide an alternative strategy for meeting Objective WR1)*** |

***Fresh Water Recharge Areas***

| | Yes | No | |
|---|---|---|---|
| 6. | | X | Is project wastewater disposed of within 300 feet of a stream or fresh surface water body? *(If 'No', then go to line 7.)* |
| | | X | Is the project located in a freshwater recharge area (FWRA) hydraulically upgradient of a stream or fresh surface water body? ***(If 'Yes', the project must provide an alternative strategy for meeting Objective WR2)*** |

***Other Potential Impacts***

| | Yes | No | |
|---|---|---|---|
| 7. | | X | Will the project withdraw more than 20,000 gallons of water per day ? ***(If 'Yes', then the project must provide documentation demonstrating that there will not be significant impacts to water levels, surface waters and wetlands)*** |

8. ***The project must demonstrate compliance with Objective WR4, including use of Low Impact Development to mitigate impacts of stormwater runoff and O & M plans for maintaining stormwater infrastructure and landscaping.***